

# Moose Population Census

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**Grades:** 4-11

**Subject:** science, math, geography

**Skills:** observation, calculation, estimation

**Duration:** 60 minutes

**Vocabulary:** census, transect, extrapolate, estimate

## Objectives:

Students will be able to: 1) census the size of a large mammal population in Algonquin Provincial Park.  
2) estimate the size of a chosen animal population.

## Method:

Students will take part in a simulated aerial survey to estimate the population of Moose in Algonquin Provincial Park.

## Background:

Have you ever wondered how many Moose there are in Algonquin Provincial Park? Trying to accurately determine the number of Moose or any animal in an extensive area is very difficult, if not nearly impossible. There are many variables that contribute to an unreliable census of a population, such as size of the area, terrain, and forest cover, movement of animals, and human error during the sampling process. Algonquin Park is a large area, 7725 km<sup>2</sup>. Trying to count all the Moose in such a large area would be physically and monetarily impossible, and even if it was possible many Moose would still be missed.

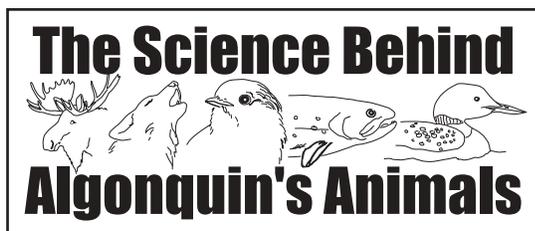
The terrain of Algonquin is very rugged, and heavily forested. While aerial surveys take place in the winter, there are still large areas with heavy conifer cover which effectively hide Moose from view. As well, Moose, like many other animals, are constantly on the move in search of food. So a Moose counted one day in one area may be counted again several days later in a different area of Algonquin.



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So how do researchers and biologist calculate the population of large mammals, like Moose, in such a large area? In order to estimate the number of Moose, researchers do aerial surveys from early January to mid February. Fifty-seven random plots are chosen, 34 on the west side of Algonquin Park and 23 on the east side. This represents 20% of Algonquin Park’s total area. Each plot measures 10 km long and 2.5 km wide. The plane is flown 120 metres above each plot in parallel lines (transects) one kilometer apart looking for Moose tracks. When tracks are spotted they are followed to the animal which is then aged, sex determined, and counted. From the plots surveyed an estimated Moose population for Algonquin Park can then be calculated.

**Materials:**

✓	Items Required	Quantity
	Sample grid overhead (provided)	One
	Map Grid of Algonquin Park (provided)	One per student or group
	Grid reference cards (provided)	Thirty
	Dry beans	One package
	Small paper or plastic cups	One per student or group
	Pencil	One per student or group
	Graph paper	One per student

**Procedure:**

- 1) Ask students how they would calculate the population of a city. Have them list why their chosen method might be accurate or inaccurate.
- 2) Ask students if they were wildlife researchers how they would estimate the population of Moose in a large, defined area. For each method that they provide have them list what factors would add or detract from the accuracy.
- 3) Once students have exhausted all possible methods explain that the best way to estimate Moose in a large area, such as Algonquin Park, is to randomly select areas to sample and then extrapolate the population to the entire geographic area.



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# The Science Behind Algonquin's Animals



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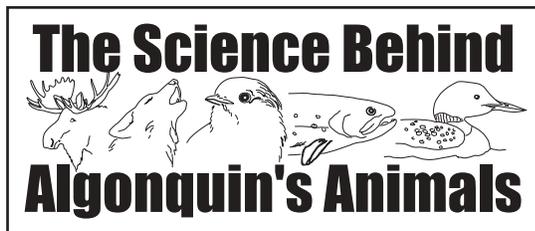
- 4) On the black board or overhead draw and label a sample map grid (4 squares x 4 squares is a good size). Randomly place marks on several squares (you may want to ask students how many marks and what squares to mark. Tell them not all squares need marks). Have students randomly pick four plots. From the four plots selected have students count the number of marks in each square. Ask them how they would then estimate the number of total marks from their census (# of marks multiplied by four [number to achieve 16 plots i.e. four sample plots multiplied by four equals total number of plots. If two plots were sampled the number of marks would be multiplied by eight] = estimated population)
- 5) Count the total number of marks on the entire grid and see if the estimated number is representative of the total number of marks. You may wish to repeat the exercise two or three times to see if the estimated number changes with each census.
- 6) Explain to the students that in the following activity they will become a wildlife biologist who is doing an aerial survey to estimate the population of Moose in Algonquin Provincial Park.
- 7) Hand out a map grid of Algonquin Park to each student. They should place it on a flat surface like their desk.
- 8) Distribute a cup with fifty beans to each student. Have the students randomly distribute their beans over the map area. The students can put as many or as few beans on each square as they like. Tell the students that not all the squares need beans.
- 9) From the thirty grid reference cards, randomly select two, three, five, six, 10, or 15 cards. **Note:** The number of plots selected must be the same for each sampling. Write these plots on the board.
- 10) Instruct the students to count the number of Moose (beans) in each of the randomly selected plots.
- 11) Have the students record the number of Moose they counted on the data sheet under the appropriate survey. Then have them multiply the number of Moose counted by 'X' ('X' being the number to multiply by to equal 30). This will give the students a rough estimation of the population size.
- 12) Tell the students to leave the beans on the grid. Repeat steps 9 to 11 at least three more times. Remember to keep the number of plots surveyed constant. If you surveyed six plots in survey one, then survey six plots in survey two.
- 13) After four surveys have been done have each student average out the population estimate. Record all the average population estimates on the board and average the population then for all the



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surveys. Is the average higher or lower than the actual number? Ask students what would account for the number being high or lower.

### **Variations:**

Using a large open area, like a gymnasium or a field, mark off a grid area. Repeat the above process but use students as Moose and one student as the researcher.

### **Evaluation:**

Ask students to:

- 1) Brainstorm why the plots are chosen randomly.
- 2) Graph the results of the individual averages.
- 3) Select an animal species and develop a population survey for that animal.

### **Activities:**

- 1) Have students find out how other types of animal populations are censused.
- 2) Have students conduct their own population census of a given animal in the school yard or local park.
- 3) Research why knowing the populations are important for wildlife researchers and wildlife managers.
- 4) Think of other factors to take into account during a population census in order to properly assess a population, (e.g. age and sex). Then have students research how wildlife researchers and biologists would effectively age and determine the sex of a Moose from the air.



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